

ELECTRONICS

Q. Define electronics, write its importance in our daily life. (L. B '09)

Ans. Definition:

The branch of applied physics, which deals with those principles and ways by which the flow of electrons is controlled, by using semi-conductors, diodes, and transistors is called "Electronics".

Importance:

- (i) Due to our household appliances such as radio, television, hi – fi sound system, video and audio cassette recorder and players provide us entertainment and all types of information.
- (ii) The various automatic machines as robot, telephone and mobile phone have rendered our work easier.
- (iii) The use of the electronic calculator has become so common that even a shopkeeper uses it for his arithmetical calculations.
- (iv) Electronic devices have been installed in artificial satellites orbiting the Earth which, by means of electromagnetic waves, keep their contact with Earth. These satellites are designed to serve world wide communication network, to scan Earth's natural resources and to provide us data on weather and climate.
- (v) The biggest achievement of electronics is computer which has taken the whole world into its grip. By using the facility of internet, provided by computers, we can contact any institution of world and get the required information.
- (vi) Now-a-days computers are being used even for shopping purposes.

Q. Explain the difference between analogue and digital electronics.

Ans. TYPES OF ELECTRONICS

We can divide electronics into two main branches, one is Analogue electronics and other is digital electronics.

(i) Analogue Electronics:

Definition

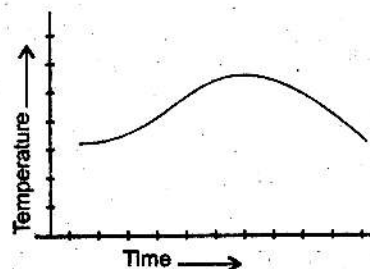
Analogue quantities are those quantities whose values increase or decrease continuously with time or remains constant are known as analogue quantities.

Example:

Temperature, Time, Pressure, Distance etc.

Temperature-Time graph

Temperature of air varies continuously during 24 hours of a day. If we plot temperature, time graph, for different values then we get graph as shown.

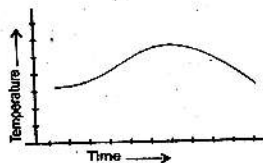
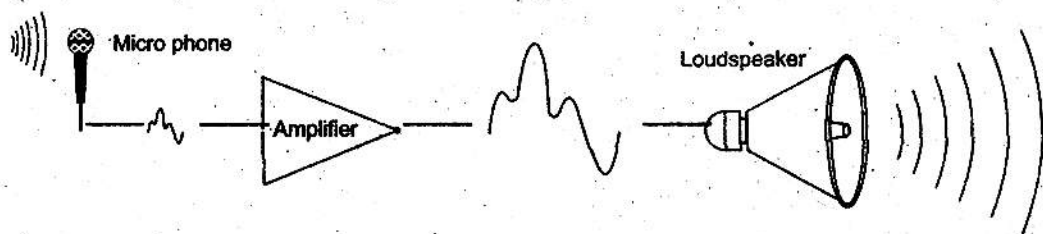


Analogue Electronics:

The part of electronics consisting of such circuits which process analogue quantities is called analogue electronics.

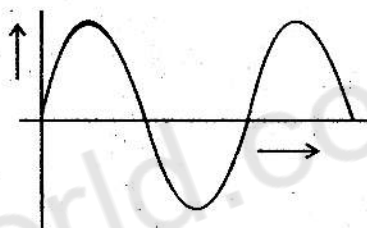
Example of Public Address System:

Public address system is an example of analogue electronic system is shown below.



Principle:

The microphone converts sound energy into continuously varying voltage. It is called analogue voltage signal. This signal is applied to an electric amplifier which is also analogue circuit, which amplifies the signal without changing its shape to such an extent that it can operate the loud speaker.



Analogue Voltage Signals

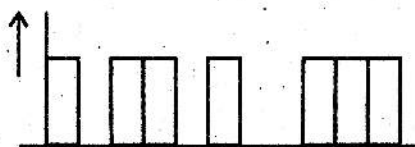
Digital Electronics:-

Definition:

That branch of electronics which provide the data in the form of maximum and minimum voltage signal is known as digital electronics.

Example:

Modern telephone system, radar system, naval and other systems of military importance, devices to control the operation of industrial machines, medical equipments and many household appliances work on digital electronics. The digits used by digital electronics are '0' and '1' and the whole data is provided in Binary system due to which processing of data becomes easy. It can be seen that digital signals provide the data by maximum and minimum voltage level.



Digital Voltage Signals

Analogue to Digital Convertor (ADC):

A circuit which converts the analogue signal into a digital one in the form of digits is known as analogue to digital converter (ADC).

Digital to Analogue Convertor(DAC):

The circuit which converts the digital Signal into analogue is called digital to analogue convertor.

Q. What are conductors, insulators, semi conductors. Explain the crystal structure of diode.

Ans.

(i) Conductor:

The substances through which electric current flows easily are called conductors. e.g gold, silver etc. Our body is also good conductor of electricity. Earth is also big conductor. In conductors free electrons are present due to which current conducts.

(ii) Insulator:

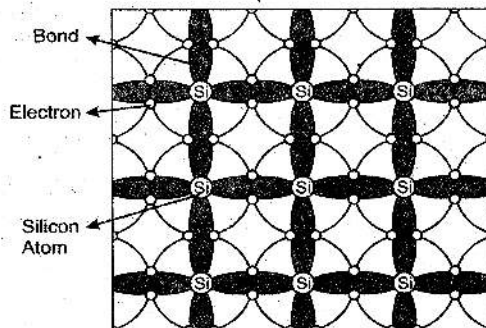
The substances through which electric current does not flow are called insulator e.g mica, plastic etc. In these substances all electrons are bounded and cannot move freely, so current does not flow through insulators.

(iii) Semi-Conductor: (L. B : 10)

Definition:-

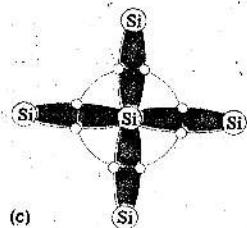
“These are the substances, whose ability to conduct current at room temperature, lies midway between conductors and insulators. Germanium and silicon are two main semi-conductors.”

Let us see how these substances develop the property of semi-conductors. Both germanium and silicon belong to fourth group of the periodic table. As such both of them have four valence electrons. If we examine the cross-section of a crystal of germanium or silicon from front side, we find that their atoms are arranged as shown in fig. The special features of this arrangement is that each atom is surrounded by four equidistant neighbours as shown in fig. These atoms are along with their four valence electrons. It can be seen that each central atom has eight electrons instead of four in its outermost orbit. It is so because it has four valence electrons of its own and four from its neighbouring atoms, one from each. As such it has eight electrons in its orbit. In this way, each atom has eight electrons in its outermost orbit. We know that if the outermost orbit possesses eight electrons, it represents as stable configuration and the electrons do not change this stable state as if they are bound in the orbit. This binding force due to which the electrons are not allowed to leave the orbit is **known as covalent bond** as shown in fig.



In this way all the valence electrons present in crystals of silicon or germanium are bound in their orbit by covalent bonds and not free electrons are available for the flow of electric current. So a crystal of germanium or silicon in its pure form behaves as an insulator. This situation occurs near zero Kelvin temperature. At ordinary temperature the electrons have a kinetic motion due to thermal kinetic energy. The motion of some of the electrons is so vigorous that the covalent bond is unable to keep them in their orbits. Such electrons break their covalent bonds and get free, leaving behind the vacancy for an electron in the orbit as shown in fig. This vacant place for an electron in the orbit is known as a hole. Whenever a covalent bond breaks, it creates an electron-hole pair. It is worth noting that in addition to free electrons, electric current also

flows due to holes. Whenever electron from a certain location moves to fill a hole, a hole is created at that particular location. When an electron from other place moves to fill this hole, a hole is created at that place. In this way electrons begin to move because of the presence of holes. This motion becomes a means for the flow of current. Thus, at ordinary temperature, a crystal of germanium or silicon becomes a semi-conductor due to presence of free electrons and holes.



Q. What is meant by doping?

Ans. Doping:

"The mixing of pentavalent impurities and trivalent impurities in pure semi-conductor to increase the conduction process is called doping."

A semi conductor can be rendered useful by increasing the number of holes and free electrons according to our requirements. This is done by adding specified quantities of a trivalent or a pentavalent atoms as impurity while a **single crystal of silicon or germanium is being grown is called doping**. This drastically increases the current conducting properties of germanium or silicon. The impurity added crystal is of two types: one is N-type and the other is P-type.

Q. How N-type semiconductor formed?

Ans. N-type Semi-Conductor:

When a pentavalent impurity such as arsenic (As), phosphorous (P), bismuth (Bi) or antimony (Sb) is added to crystals of silicon or germanium, the number of free electrons increase in it is called N-type semi conductor. The impurity is usually in the ratio of $1:10^8$ i.e., for 10^8 atoms of silicon or germanium there is one atom of the impurity.

Q. How does the number of free electrons increased in N-type semi-conductor? (L.B '10)

Ans. Antimony, being a pentavalent atom, has five valence electrons. Four of them get bound by forming covalent bonds by sharing one electron from each of the four silicon neighbours. But the fifth electron of antimony atom does not find any electron from its four neighbours to form a covalent bond. As such it becomes a free electron. Thus, each impurity atom gives birth to a free electron. This increases the number of free electrons as compared to pure crystal. By controlling the number of impurity atoms during doping, the required number of free electrons can be obtained. In a N-type semi-conductor, current passes mostly due to free electrons.

Q. How p-type semiconductor formed?

Ans. If a trivalent impurity atom such as aluminium (Al), indium (In), boron (B) or gallium (Ga) is doped while preparing single crystal of germanium or silicon, the number of holes in these impure crystals is much greater as compared to the number of holes in pure crystal. Such doped semi-conductors are known as P-type.

Q. How does number of holes increase in p-type semiconductor? (L.B '10)

Aluminium being trivalent, has three valence electrons which forms covalent bond by sharing one electron from each of its three silicon neighbours. But the aluminium atom does not provide any electron for sharing to its fourth neighbouring atom. Thus a vacancy for an electron

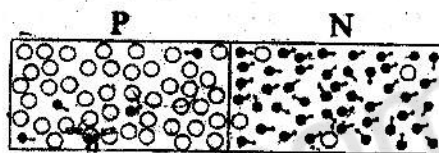
is created here i.e. a hole has been formed. As every impurity atom creates a hole, therefore the number of holes in such crystals is much larger as compared to that in a pure crystal. In a P-type semi-conductor, nearly the whole of current flows due to holes.

Q. Explain P-N Junction.

Ans. Definition:

If a crystal of silicon or germanium is doped in such a way that its one part becomes N-type and the other P-type then P-N junction would be formed in between. On one side of this junction, there would be a region of N-type having free electrons as majority charge carriers. On the other side of the junction, there would be a region of p-type having holes as majority charge carriers. The black dots show electrons which being free, are moving randomly. While small circles represent holes. The holes do not have a random motion. They move while remaining in their respective orbits.

Just after the formation of P-N junction, some of the electrons of N-type region, due to their free random motion cross the junction and enter into the P-type region where the holes are in abundance. When an electron reaches the site of a hole it fills the hole present in its orbit, then the number of electrons in its orbit becomes four. In this way this atom is converted into a negatively charged ion. Note that in a crystal, every atom has a fixed seat, so the negative ion does not move from its place. In this way, as more and more electrons enter into the P-region from the N-region, a layer of immobile negative ions is formed in the p-region.



P-N Junction

Now let us observe the changes which take place in the N-region as the free electrons leave this region. This region contains pentavalent impurity atoms which have five valence covalent bonds while the fifth one is free. As this electron leaves its parent atom and enters into the P-region, the number of electrons in this particular impurity atom gets short by one due to which it is converted into an immobile positive ion. In this way as more and more electrons enter from N-region into P-region, a layer of positive ions, adjacent to the junction, is formed in the N-region.

These layers of positive and negative ions formed just across the junction in the n and P-regions are shown in fig. These layers of positive and negative ions create a potential difference across the sides of the junction. Therefore, a positive potential appears at the N-type side of the function and a negative potential appears at the P-type side of the junction. This potential difference tends to stop the motion of electrons from N-region to P-region. As the electrons continue to cross the junction from n to P-region the layer of positive and negative ions across the junction becomes wider. This also increases the potential difference created by these layers till it reaches to such a value that it completely stops the entry of the electrons from N to P-region. As **this potential difference does not allow the electrons to cross the junction from N to P region, so it is known as potential barrier.** In case of silicon its value is 0.7 volt and in case of germanium its value is 0.3 volt.

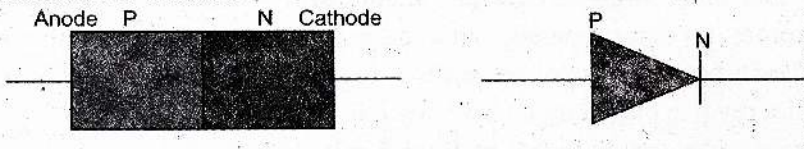
"The region of the layers of positive and negative ions across the junction does not contain free electrons or holes, so it is known as depletion region".

Q. Explain Semi-conductor Diode? How it acts as forward Biased and reverse biased?

(L. B '10)

Ans. Semi Conductor Diode:

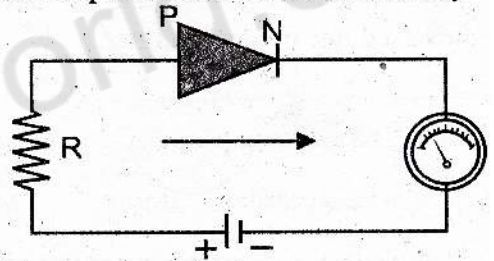
"When the P and N-regions of a P-N junction are connected to metallic wires and enclosed in a glass or a metallic case in such a way that only the wires connected to N and P-regions project outside the case, then such an encapsulated P-N junction is known as a diode". Its P part is known as anode and N part as cathode as shown in fig. Fig. shows the symbolic representation of a diode.



Under ordinary conditions, no current passes through a diode due to its internal potential barrier. If a external potential source, for example, a battery is connected across the junction so that current begins to flow through it, the diode is said to be forward biased. For this two conditions are to be satisfied.

i- The P-junction or the anode of the diode is connected with the positive terminal of the battery and its cathode with the negative terminal of the battery as shown in fig.

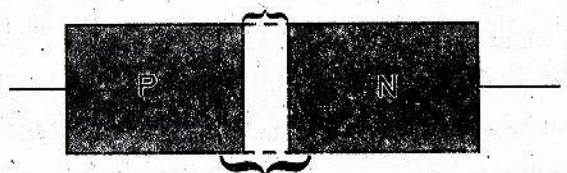
ii- The potential of the battery should be greater than the potential barrier of the diode so that the battery could provide the requisite amount of energy to charge carriers present in the P-N junction to overcome the potential barrier. A specific amount of current is allowed to flow through a diode.



If the current passing through the diode exceeds this specific value, the diode gets heated and is likely to be damaged. Therefore, in the biasing circuit of fig., a resistance R has been shown which limits the current passing through the diode within its specific value.

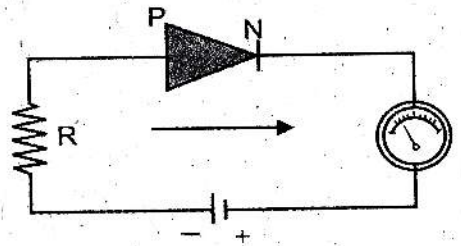
Forward biased diode

When a diode is forward biased, the width of its depletion region decreases. It means that the quantity of positive and negative ions present in the depletion region becomes less due to which the potential barrier also gets low and the current begins to flow easily through the junction. In this situation, the resistance of the junction is only a few ohms. Similarly, in fig., the potential barrier of an unbiased diode has been shown by dotted lines, whereas that of a forward biased diode has been shown by ordinary lines.



Reverse biased diode:

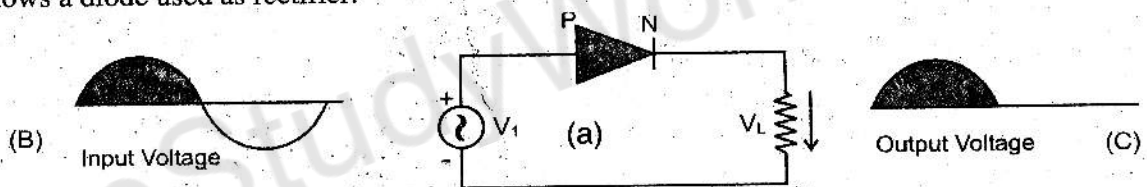
When the P part of the diode, i.e. its anode is connected with the negative terminal and its cathode with the positive terminal of a battery, the diode is said to be reverse biased as shown in fig. In this state, the current passing through the diode is nearly zero and we can say that in general, no current flows through a reverse biased diode. It is because of the fact that in reverse biased state, the width of the depletion region increases due to which the potential barrier becomes so high that the charge carriers are unable to overcome it. Therefore, no current passes through the junction. In this state, the resistance of the junction or the diode becomes equal to several mega ohms. Like the depletion region and potential barrier of a reverse biased diode are shown in fig.



Q. How does semi-conductor diode act as Rectifier?

Ans. Semi-Conductor diode as a Rectifier:

Ordinarily electricity is provided to us in the form of alternating voltage but most of electronic devices operate by direct current (D.C). Therefore, it becomes necessary that we convert the alternating voltage to D.C. "The process of converting alternating voltage into D.C. is known as rectification and the device used for this purpose is known as rectifier". Fig (a) shows a diode used as rectifier.



V_1 is the input alternating voltage by which we want to pass a direct current through the load resistance R_L .

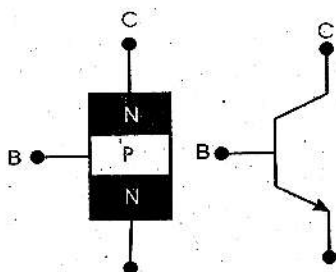
During the positive half cycle of the input voltage, the anode of the diode is at a positive potential, therefore, the diode is forward biased and the current easily passes through the diode and flows through the load resistance R_L . The direction of the flow of the current has been shown by the signs of arrow in fig. (a). As the resistance of the diode in forward biased condition is very small as compared to R_L , therefore almost the whole of input voltage appears across R_L as shown in fig. (c).

During the negative half cycle of the input voltage, the anode of diode is at a negative voltage. So it is reverse biased and does not allow the current to pass through load resistance R_L . Therefore voltage across R_L remains zero.

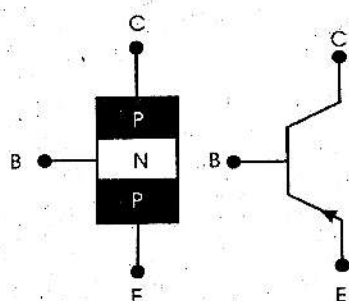
Thus the current through R_L passes only in one direction. In this way diode acts as rectifier.

Q. What is transistor? Give its working and uses.

Ans. If a crystal of germanium or silicon is doped in such a way that N-type region are formed at its two sides with a very thin P-type region in between, it forms as N-P-N transistor.



N-P-N Transistor



P-N-P Transistor

If a crystal of germanium or silicon is doped in such away that P type regions are formed at its two sides with a very thin N type region in between it formed P-N-P transistor.

Base:-

The central region of the transistor is known as base.

Emitter, Collector:

Regions on either side of base are called emitter and collector.

Working:

Transistor consists of two junctions

- (i) Emitter Base (ii) Collector Base.

Generally Emitter Base junction is forward biased, while collector base junction is reverse biased.

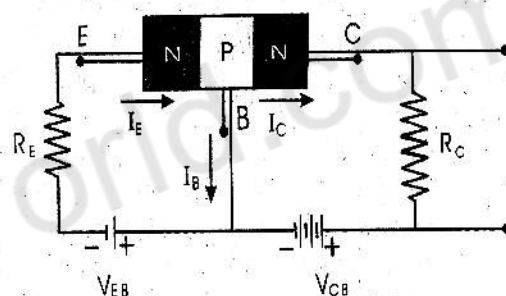
The potential V_{CB} that reverse biases the collector base junction is many times larger than the potential V_{EB} that forward biases the emitter base junction.

Flow of Current Through Junction:

Since the emitter base junction is forward biased so its resistance gets very low and stream of electrons is injected from the emitter in to base . So the current begins to flow through this junction and resistance R_E is used to control this current. Since the base region is very thin. So practically almost all the electron injected in to the base are attracted towards the collector due to its large +ve potential and very few electrons enter into the base circuit. So the current I_C begins to flow in the collector circuit and a current I_B in the base circuit. As it is the emitter current I_E injected from the emitter into base which is actually divided into the collector current I_C and base current I_B . So $I_E = I_C + I_B$.

Uses of Transistor:

The importance of the transistor is based upon the fact that the value of the collector current I_C is many times greater than the base current. So by applying small voltage V_i in the base circuit



if I_B is changed slightly then collector current I_C changes largely this gives rise to big change in potential V_o across the resistance R_C . Small change V_i in the base circuit after increasing many times appears as a voltage V_o in the collector circuit. So transistor acts as amplifier.

Q. What are basic operations of digital electronics?

Ans. Basic operations of digital electronics:

A circuit can either be on or off. It cannot have a third state. A given statement would be either true or it would be false. A switch would be either open or closed.

Boolean Variables:

Such things which can have only two possible states are known as Boolean variables. The two states of Boolean variables are usually represented by the digits "0" and "1".

Example:

A closed switch is represented by "1" and an open one by "0". If there are two switches and one says that they are in state 1 then it would mean that both of them are closed.

Output Current:

Suppose we form a circuit by connecting some resistors, two switches and a battery. As a result of this connection, some current may pass through the circuit. In this case the output also has only two states. Depending upon the states of the switches, the current either would pass or it would not pass. Thus the output current is also a Boolean variable.

Input Current:

In case the current is passing, we can say the value of output is "1" and it is zero when no current is passing. Whether the value of the output would be "1" or "0", it depends upon the values of Boolean variables which specify the state of the switches.

In this example, the switches form the input Boolean variable because the value of output depends upon the state of these variables.

The question arises that if the values of input variables of a circuit or a system are known, then how can the value of the output be determined? In order to solve this problem, digital electronics require three basic operations known as AND operation, OR operation and NOT operation.

Q. Explain AND operation.

In order to understand AND operation, the input variables A and B as two switches are consider. Suppose there are four possible states of these two switches which are given below.

- | | |
|---|---------------------|
| i- Both A and B are open | i.e. $A = 0, B = 0$ |
| ii- The switch A is closed and B is open | i.e. $A = 1, B = 0$ |
| iii- The switch A is open and B is closed | i.e. $A = 0, B = 1$ |
| iv- Both switches A and B are closed | i.e. $A = 1, B = 1$ |

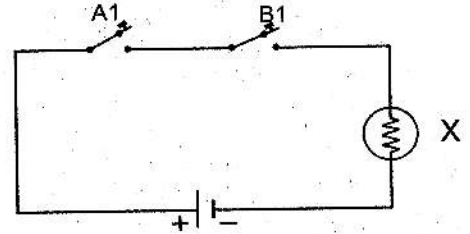
A	B	$X=A.B$
0	0	0
1	0	0
0	1	0
1	1	1

The table shows the four possible states of the switches A and B, A circuit is formed by connecting these two switches in series as shown in the figure.

Whether a current would pass through the circuit or not, it depends upon the state of the switches.

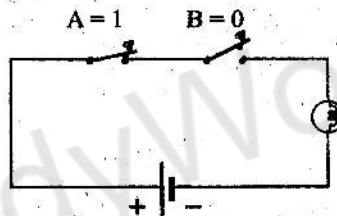
In this circuit A and B are two input variables, whereas the current passing through the circuit is the output variable X. Its values would be 1 when the bulbs connected in the circuit glow showing that current is passing through the circuit. But the value of X would be 0 when the current through the circuit does not flow and the bulb, would not glow.

One can find out the value of the output X for all possible values of the input variables A and B as given in the table.

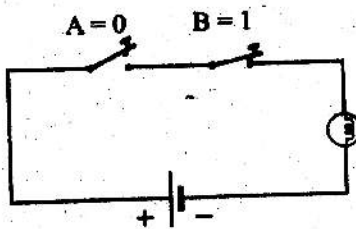


(i) In the first line of the table $A = 0$, $B = 0$, i.e. both the switches are opened. In this condition, no current would pass through the circuit so, the value of X would be 0.

(ii) In the second line of the table, $A = 1$, $B = 0$, i.e. switch A is closed and B is open as shown in the figure. In this condition no current would also pass through the circuit and $X = 0$.

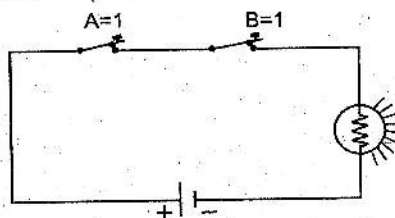


(iii) In the third line of the table $A = 0$, $B = 1$ i.e. switch A is open and B is closed as the figure shows.



No current would pass through the circuit i.e. $X = 0$

(iv) In the fourth line of the table $A = 1$, $B = 1$ i.e. both the switches are closed.



Now the current would pass through the circuit and the bulb would glow. Thus X would be 1 in this case. The value of X for the various values of the Boolean variables A and B is shown in the following table.

A	B	X
0	0	0
1	0	0
0	1	0
1	1	1

When ever two Boolean variables operate in such a way as two switches are connected in series, then their operation is said to be AND operation.

Definition:

AND operation can be defined as such a logic operation that its output is 1 only when all the value of its inputs are 1 it is represented by the sign of multiplication or by a dot. The output X obtained as a result of AND operation shown in the table is written as $X=A.B$. It is read as X equal A AND B. The table is called the truth table of AND operation. Truth table shows all the values of the output for each set of the values of the inputs. By using the sign of AND operation, the various lines of the truth table can be written as in the following table.

$0.0 = 0$
$0.1 = 0$
$1.0 = 0$
$1.1 = 1$

Logic Operations:

The various operations of Boolean variables are called logic operations because the various variables used in the subject of logic also possess two values. The word "truth" has also been borrowed from this subject.

In digital electronics, the 0 and 1 values of the variables are simulated by two different levels of the potential.

Usually 0 is represented as zero, or ground potential and 1 by 5 volts or by any other suitable voltage.

Logic Gates:

Such circuits have been designed which implement the various logic operations. These circuits are known as logic gates.

AND Gate:

The circuit which implement the AND operation is known as AND gate. Its symbol is shown in the figure.

It has two or more than two inputs and only one output. It operates in such a fashion that the value of its output is always in accordance with the truth table of AND operation, i.e. the value of its output is only



1(5 volts) when all of its inputs are at 1 (5 volts). For all other values of the inputs the output would be zero.

Q. Explain OR operation.

If two switches A and B are connected in parallel combination and a circuit is made as shown in the fig., then the this circuit will depend upon the state of the switches A and B i.e. upon the value of the input variable A and B.

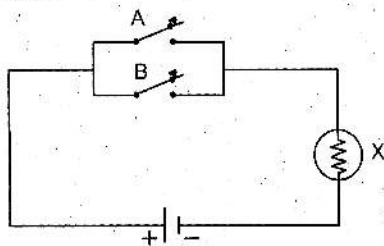


Fig (i)

According to the values of A and B we can make circuit as follow:

(i) $A = 0$, $B = 0$, then $x = 0$ as shown

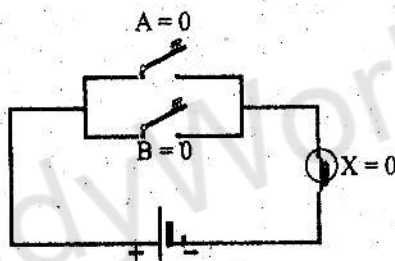
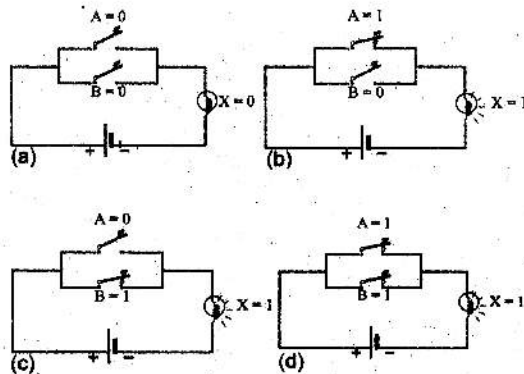


Fig (ii)

In this case, the Boolean variables A and B will have a set of four possible values as shown in Table. According to the values of A and B in each line of this table, a circuit has been drawn in the Fig. (a,b,c,d). It can be seen in this figure that the value of X is 0 only in the state when $A = 0$ and $B = 0$. In all other states, the current flows through the circuit and the value of X is 1. In table, the value of output X is written for all possible values of A and B. This is the truth table of OR operation. We can define

B	A	X
0	0	0
0	1	1
1	0	1
1	1	1

“OR operation is that in which the output has a value 1 when at least one of its inputs is at 1. The output is 0 only when all the inputs are 0.”



OR operation is represented by the plus sign (+). The value of X in the table would be written as $X = A + B$.

It is read as X equals to A OR B. By using the symbol of OR operation, the various lines of the truth table of OR operation can be written as in Table.

OR Gate

"The electronic circuit which implements the truth table of OR operation is known as OR gate". It is symbolically shown in fig. It has two or more than two inputs and has only one output. It operates in such a fashion that its output is at 1 (5 volts) even when one of its output is at 1 (5 volts). The value of its output would be 0 only when all of its inputs are at 0. In other words the value of its output is in accordance with the truth table of OR operation.



OR Gate
Table

$0 + 0 = 0$
$0 + 1 = 1$
$1 + 0 = 1$
$1 + 1 = 1$

Note that although the symbol of OR operation is the same as the plus sign, yet its operation is quite different from the action of plus sign. For example, we would write the fourth line of the truth table of the OR operation as $1 + 1 = 1$

Q. Explain NOT operation:

A Boolean variable, after NOT operation changes its state and acquires the second possible state. For example, if the value of a Boolean variable is 0, then after NOT operation it would change to 1. Similarly if its value is 1, then after NOT operation, it would be 0. Thus NOT operation inverts the value of Boolean variable.

If the value of a Boolean variable, after NOT operation becomes X, then it is symbolically written as

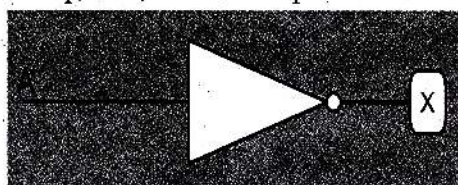
$$X = \bar{A}$$

Table

A	\bar{A}
0	1
1	0

NOT operation is represented by a sign of bar and it is read as X equals A NOT. Table is the truth table of NOT operation.

"The electronic circuit which implements NOT operation is known as NOT gate". It is symbolically represented in Fig. It has only one input terminal and only one output terminal. It operates in such a fashion that if its input is 0, its output would be 1. Similarly the inputs 1, then its output would be 0.



NOT Gate

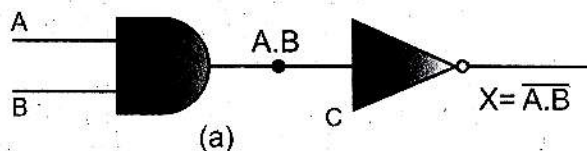
Q. Explain NAND Gate.

"A NAND gate is formed by coupling a NOT gate with the output terminal of an AND gate. The NOT gate inverts the output of the AND gate. The output of the NAND gate equals to $\bar{A.B}$ as is written as $X = \bar{A.B}$."

It is read as X equals A AND B NOT. The NAND gate has been symbolically shown in fig.(b). In this figure, the NOT gate has been replaced by a small circle, i.e. in the symbol of NAND gate, the small circle attached at the output of AND gate shows NOT operation. Table is the truth table of NAND gate. In each line of this table, the value of the output has been obtained by inverting the value of the output of the AND gate corresponding to that line.

Table

A	B	$X = \bar{A.B}$
0	0	1
0	1	1
1	0	1
1	1	0



(a)



(b) NAND Gate

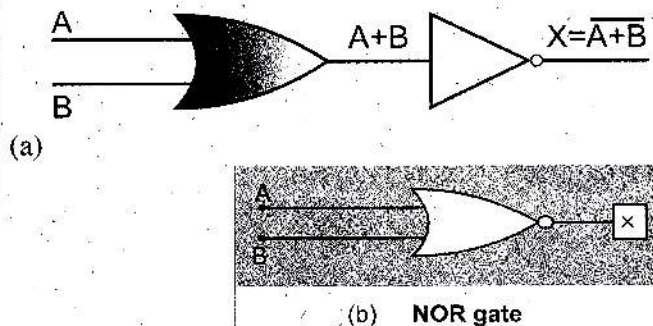
Q. Explain NOR Gate:

In this gate the output of OR gate is coupled with a NOT gate as shown in fig. (a). This NOT gate inverts the output $A+B$ of the OR gate i.e. the output of the NOR gate $\bar{A+B}$ which is expressed by the following equation $X = \bar{A+B}$.

It is read as X equals A OR B NOT. The symbol of NOR gate is shown in fig. (b). Table is the truth table of NOR gate. In this table, the value of output has been written by inverting the output of OR Gate.

Table

A	B	$X = A + B$
0	0	1
0	1	0
1	0	0
1	1	0



Q. Explain the uses of the logic gate.

Uses of Logic Gate:

Logic gates are used to perform different types of jobs in digital electronics. Here we will describe one of its uses.

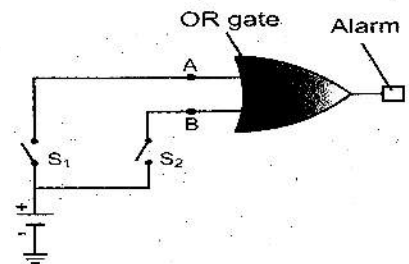
House Safety Alarm:

Suppose there is a room in a house which has one door and one window. We require that whenever a person opens the door or window, the alarm starts ringing.

For this purpose, switches are fitted—one each with the hinges of the window and door. This switch is such designed that when the door or window is closed then its output is at 0 and when the door or window is opened, then its output is at 1 i.e. 5 volts.

Switch S_1 is fitted with the hinge of the door in such a way that when the door is closed, the switch is open and its output is 0. As soon as the door is opened, the switch gets closed and its output becomes 5 volt, i.e., it acquires the state 1. The switch S_2 which is fitted with the hinge of window, operates in a similar fashion. The outputs of these switches are connected with the input terminals of an OR gate whose output is connected with an alarm system. The alarm system consists of a relay and a bell. It operates in such a way that whenever the output of the OR gate is in 1 state, the alarm system starts working and the bell begin to ring. When the output of OR gate is zero, the alarm remains quiet.

When door and window are both closed, both of the inputs of the OR gate would be in 0 state, so its output would also be zero and the alarm would be quiet. But as soon as the door or window is opened, then one of its input terminals acquires the 1 state. According to the truth table of OR gate, now the output of OR gate would become 1 due to which alarm would continue to start ringing as long as either of the window or door or both of them remain open.



MULTIPLE CHOICE QUESTIONS

Q. Circle the correct answer.

1. **Electronics is a branch of: (2006)**
a) mass b) applied physics
c) mechanics d) nuclear physics
2. **Electronics is the study of principles by means of which we control the:**
a) flow of electrons
b) nuclear fission
c) fusion reaction
d) radiations
3. **The quantities, whose values remain constant or vary continuously are called:**
a) analogue quantities
b) digital quantities
c) maximum quantities
d) minimum quantities
4. **Analogue quantity:**
a) time b) pressure
c) distance d) all of these
5. **Public address system is the example of:**
a) analogue electronics
b) digital electronics
c) binary system
d) none of these
6. **The digits used in electronics are:**
a) 1 b) 0
c) 0 and 1 d) 1 and 2
7. **Digital technology is used in:**
a) Bulb b) radar
c) electric motor d) all of these
8. **The converter of analogue to digital signal is:**
a) ADC b) DAC
c) ATDC d) none of these
9. **The converter of digital to analogue signal is:**
a) ADC b) DAC
c) DATC d) DTC
10. **The materials through which electric current passes easily are called:**
a) conductors
b) insulators
c) semi conductors
d) none of these
11. **Gold and silver are:**
a) conductors b) insulators
c) semi conductor d) none
12. **The materials through which current does not pass are called:**
a) conductors b) Insulators
c) semi conductors d) none
13. **Mica, plastic and glass are:**
a) conductors b) insulators
c) semi conductor d) none
14. **At zero kelvin temperature it is insulator:**
a) silicon b) Germanium
c) both a and b d) Boron
15. **The crystal after adding impurity are called:**
a) n-type b) P-type
c) both a and b d) junction
16. **A closed switch in Boolean expression is represented by:**
a) 0 b) 1
c) 10 d) 2
17. **An open switch in Boolean expression is represented by:**
a) 0 b) 1
c) 10 d) 2
18. **AND operation can be expressed by: (2005)**
a) $x = A + B$ b) $x = A.B$
c) $X = \overline{A.B}$ d) $x = \overline{A + B}$
19. **NAND gate is symbolically written as:**
a) $x = \overline{A + B}$ b) $x = \overline{A.B}$
c) $x = A.B$ d) $x = A - B$
20. **If A input is 1, and B is zero, than in AND operation output will be:**
a) 0 b) 0, 1
c) 1 d) None

21. Usually use of transistor in electronics is:

- a) electrification b) amplification
- c) capacitance d) magnetism

22. If base current is increased a little the collector current:

- a) increases b) decreases
- c) increases rapidly
- d) decreases rapidly

23. In transistor, usually emitter base Junction is kept:

- a) forward biased
- b) reverse biased
- c) a and b d) closed

24. The device used for rectification is:

- a) amplifier b) diode
- c) transistor d) resistor

25. In case of germanium the maximum value of potential barrier is:

- a) 0.3V b) 0.5V
- c) 0.7V d) 0.4V

26. In case of silicon the maximum value of potential barrier is:

- a) 0.3V b) 0.5V
- c) 0.7V d) 0.4V

27. In P-type semi-conductors, the majority carriers are : (2007)

- a) electrons b) protons
- c) holes d) both a & b

28. The impurity usually added in a semi conductor in a ratio:

- a) $1:10^4$ b) $1:10^6$
- c) $1:10^2$ d) $1:10^8$

29. When pentavalent impurity is added to silicon it becomes:

- a) P-type b) N-type
- c) both a and b d) none

30. When a trivalent impurity is added to germanium it becomes.

- a) P-type b) N-type
- c) both a & b d) none

31. Atomic number of silver is 47. the number of its valence electron would be:

- a) 1 b) 7
- c) 8 d) 18

32. In a N-type crystal, the majority carriers are:

- a) holes b) free electrons
- c) protons d) positrons

33. The output of OR gate would be 'O' when: (2007)

- a) Both of its inputs are 'O'
- b) one of its two inputs is zero
- c) Both of its inputs are 1
- d) Anyone of its inputs is 1

34. The output of an AND gate is only 1, when:

- a) Both of its inputs are zero
- b) Anyone of the two inputs is zero.
- c) Both of its inputs are 1
- d) anyone of the two inputs is 1

35. The two inputs of a NAND gate are A and B. Its output would be zero when: (L.B. '05)

- a) $A = 0, B = 0$
- b) $A = 1, B = 0$
- c) $A = 1, B = 1$ d) $A = 0, B = 1$

36. A and B are the two inputs of a NOR gate. Its output would be 1 when: (2005 and 2006)

- a) $A = 1, B = 1$ b) $A = 0, B = 1$
- c) $A = 1, B = 0$ d) $A = 0, B = 0$

37. It is called PN Junction: (2004)

- a) Diode b) Transistor
- c) Capacitor d) Transformer

38. The basic operation in digital electronics are: (L.B. '05)

- a) 1 b) 2
- c) 3 d) 4

39. A PN-Junction encapsulated in a metal or glass case is called: (L.B. '06)

- a) semi conductor diode
- b) Rectifier
- c) Transistor
- d) Amplifier

40. The speed of Radio Waves is _____ as compare to sound waves: (L.B. '06)

- a) Less b) More
- c) much less d) equal

41. When a diode is forward biased the width of its depletion region is: (L.B. '07)

- a) increases b) decreases
- c) finishes d) remain same

42. The variation in the electronics are not continuous: (L.B. '10)

- a) Analogue b) industrial
c) Digital d) Domestic

43. Gate is used in the safety alarm:

(L.B. '10)

- a) NOR b) OR
c) NAND d) AND

44. Which of the following gates would have 1 as output:

(L.B. '10)

a)



b)



c)



d)

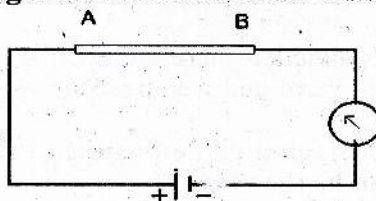


ANSWERS

1.	b	2.	a	3.	a	4.	d	5.	a	6.	c	7.	b
8.	a	9.	b	10.	a	11.	a	12.	b	13.	b	14.	c
15.	c	16.	b	17.	a	18.	b	19.	b	20.	a	21.	b
22.	a	23.	a	24.	b	25.	a	26.	c	27.	c	28.	d
29.	b	30.	a	31.	a	32.	b	33.	a	34.	c	35.	c
36.	d	37.	a	38.	c	39.	a	40.	b	41.	b	42.	c
43.	b	44.	a										

SHORT ANSWERS

Q.1: By looking at the following circuit tell whether AB is a conductor or an insulator?



Ans. Since ammeter showing deflection so we can say that current is passing through the circuit so the AB is a conductor.

Q.2: What do you mean by analogue quantities?

Ans. Those quantities which vary continuously or remain constant are known as analogue quantities.

Q.3: What is analogue Electronics?

Ans. The part of electronics consisting of such circuits which process analogue quantities is called analogue Electronics e.g. public address system.

Q.4: Which two digits are used in digital electronics?

Ans. 0 and 1 are used in digital electronics.

Q.5: What do you understand by analogue to digital converter?

Ans. Since analogue quantities in digital circuit can not be processed. Therefore circuit has been made which convert analogue signal to digital one in the form of digits. Such circuits are known as an analogue to digital converter (ADC).

Q.6: What is hole?

Ans. The vacant space for an electron in the orbit is known as a hole.

Q.7: What is P-N Junction?

Ans. If we dope crystal of germanium or silicon in such a way that one part becomes N-type and the other P-type then a P-N Junction is formed between them.

Q.8: Why current does not pass through a reverse biased diode?

Ans. Since the width of depletion region in reverse biased diode increases due to which the potential barrier becomes so high that the charge carrier are unable to over-come it. Hence no current passes through this Junction.

Q.9: What is meant by rectification?

Ans. Converting of alternating voltage to D.C is called rectification.

Q.10: Write down the names of three basic operations of digital Electronics.

Ans. The three basic operations are

- i) AND operation ii) OR operation iii) NOT operation

Q.11: What are the two values of variables in digital electronics?

Ans. In digital Electronics the 0 and 1 values of variables are stimulated by two different levels of potentials i.e. 0 for ground level and 1 by 5 volts or any other voltage.

Q.12: Define AND gate?

Ans. The circuit which implements the AND operation is known as AND gate.

Q.13: What is NAND GATE?

Ans. A NAND gate is formed by coupling a NOT Gate with the output terminal of an AND gate is called NAND gate.

Q.14: Define NOR GATE.

Ans. The gate in which the output of OR gate is coupled with a NOT gate is called NOR GATE.

Q.15: How diode is forward biased? What is its resistance in this case?

Ans. The diode is forward biased when P type is connected with positive and N type is connected with Negative terminal. Its resistance is very low in this case.

Q.16: What is number of charge carrier in the depletion region formed across the P-N junction?

Ans. On both sides of the P-N junction there are no free charge carrier in depletion region. This region contains immobile positive and negative ions. So number of charge carrier in this region is zero.

Q.17: No current is flowing through a diode in spite of the fact that a potential has been applied across its end. What can be the reason?

Ans. The reason is that diode is acting as reverse biased in this case. So no current is flowing through it.

Q.18: What is meant by doping?

Ans. A pure semi conductor can be rendered useful by increasing the number of holes and free electrons according to our requirement. This is done by adding specified quantity of a trivalent or pentavalent atom as impurity while a single crystal of silicon or germanium is being grown.

Q.19: What is forward biased Junction?

Ans. When the potential is applied across the terminals of PN-junction diode in such a way that current begins to flow through it, then the diode is said to be forward biased. For this cathode of PN-junction should be connected to the positive terminal of battery and anode to the negative terminal of the battery.

Q.20: what is reverse biased Junction?

Ans. When the 'P' part of diode is connected with negative terminal of the battery and its cathode is connected with positive terminal of battery then it is reverse biased Junction.

Q.21: Why is the potential developed across a P N junction called potential barrier?

Ans. Because this potential difference further stop, the motion of electron from N to P type, so this is called potential barrier.

Q.22: What is transistor?

Ans. It is semi conductor device in which a crystal of silicon or germanium is doped in such a way that N-type regions are formed at its two sides with a very thin P-type region in between, it forms a N-P-N transistor. Alternatively the crystal can be formed such that it can have P-type regions at the two sides with a thin N-type region in the centre. Such a transistor is known as P-N-P transistor.

Q.23: What are logic gates?

Ans. Such circuits have been designed which implement the various logic operations. These circuits are called logic gates.

Q.24: What are Boolean variables?

Ans. Such things which can have only, two possible states are known as Boolean variable.

Q.25: What is the number of free electron and holes in a pure semi conductor at zero Kelvin?

Ans. A pure semi conductor behave as an insulator at zero Kelvin. So there is no free electrons and holes in it.

Q.26: Name five analogue and five digital devices that are commonly used in our daily life?

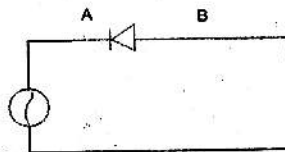
Ans. Analogue devices are: Loud speaker, Analogue watch, Public address system, Electric Lamp, Refrigerators, Digital devices are: Digital camera, Mobile phone, Radar, Computer, Security system,

Q.27. A Semiconductor has equal number of free electrons and holes. Is the semi conductor in its most pure form or it has pentavalent impurity?

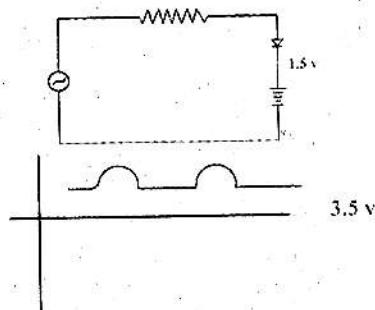
Ans. A semi conductor is in its most pure form because it has equal number of free electrons and holes.

Q.28. Draw the output wave form of the following circuit?

Ans. In this case diode is reversed biased, its output wave form is



(ii) In this case its output waveform is in this form.



INFORMATION TECHNOLOGY

Q. What do you mean by information technology? What sources are used for it?

Ans. Definition:

The scientific method of storing, arranging information for proper use and to communicate them to others is called the information technology (IT).

Explanation:

Information technology is changing speedily. It is not long ago when the telephone was the only device of communication with in the country or abroad. Now-a-days in addition to telephone, fax machine, computer and internet etc are the main sources of contact. These sources have brought in contact the whole world. By these devices informations are transmitted in the form of sound, picture and computerized data.

Q. What does mean by telecommunication? Write its sources.

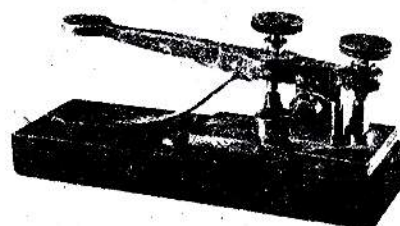
Ans. TELECOMMUNICATION:

Definition:

The method that is used to communicate informations to far off places instantly is called "telecommunication".

Telegraph:

Telegraph was the early form of telecommunication through which messages or information were converted into electric pulses by a transmitter. The current of these pulses is received very far away passing through wires where these signals comprising electric pulses are converted into audible signals. Latest telecommunication devices are much better and more efficient.



Telephone:

Working principle of a telephone is similar to telegraph but direct conversation can be processed by it. A microphone is fitted in the telephone handset. It changes vibrations produced by conversation into electric signals which are transmitted along a wire to the receiver at the other end of the line. Here an electromagnet and a vibrating diaphragm change the electric signals again into sound. Network of telephone provides a contact between two telephones. In modern network exchange contacts are made through optical fiber system microwave transmission or via satellites.

Q. Write a note on Mobile Phone.

Ans. Cellular or Mobile Phone:

Radio technology is applied in a mobile phone. It is a type of a radio having two way communication. A mobile phone carries a radio transmitter and a receiver inside it. It sends and receives the messages in the form of radio waves. Our sound waves are converted into radio waves and then reach a nearby station which is linked with the telephone network. The area of each station works as a cell. When the call reaches from one cell to the other the radio signals emitted by telephone get connected with the next station by an automatic system. Mobile receiver again changes the radio signals into sound.

Another latest form of the telephone is the photo phone or video-phone. Contrary to a common telephone, speakers can see the picture of each other. It is the height of electronic communication that the distant speakers feel acquainted with the physical existence of each other.

Q. Write a note on Telex Machine.

Ans. Telex Machine:

Tele printer and exchange machine send the documents through telephone cables by electrical signals to the other telex machine where original print is received. But before converting the document into electrical signals it has to type on telex machine. Now its use is abolished to some extent.

Q. Write a note on Fax Machine.

Ans. Fax Machine:

Documents of considerable importance are sent from one place to the other through fax machine with telephone line. Fax machine first gets the reflection of the document like Photostat machine, changes it into electronic signal and then transmits it via telephone line. The message when reaches the receiving fax machine, it reproduces the signal in an image print on a paper again.



Q. Write a note on Radio.

Ans. Radio:

Marconic, an Italian scientist succeeded in inventing a radio, about twenty years after the invention of telephone. Radio is such a source of communication in which message is transmitted by electromagnetic waves. At the studio of radio station When a speaker uses microphone for conversation his voice changes into electrical signals. These signal waves are spread all around by a high antenna. When these waves strike the radio aerial, a weak alternating current of the same particular frequency is produced.

Similarly waves of some other radio stations also produce currents of their own particular frequencies. Tuning circuit fitted in the radio selects the station waves of the choice and



strengthens them. This signal reaches the amplifier and then the loud speaker changes the electric signals again into sound. Thus we hear the sound broadcasted from a place hundreds of kilometer away.

Q. Write a note on T.V.

Ans. Television (TV):

Picture and sound reaches us via radio waves or a cable on a TV. At T.V. station moving pictures and sounds are converted into electric pulses then their audio video signals are prepared and broadcasted all around by a high antenna, which scatter in all directions in the form of electromagnetic waves. When these waves strike the TV antenna, it produces very weak alternating current of the same frequency. Specific instruments fitted in the TV set separate the sound and picture signals, which are strengthened by the amplifier.

TV tube displays the picture part of the audio video signal on TV screen where as sound is received through the speakers. Instead of broadcasting, EM waves are sent to a TV set via special wire called cable. High quality picture and sound is received with the help of a cable.



Q. What is meant by computer? Explain.

Ans. Computer:

“Computer is an electronic machine which after analyzing and arranging the given information, presents it in a very short time. All the work is done by the computer in the light of those instructions which are called a “Programme” and is saved in its memory”, computer preserves this programme and information in its memory so long as we desire. The important parts of a computer are given below:

(i) Input Devices:

In the computer calculations and instructions are inserted by an input unit. Usually a key board similar to type writer is used for this purpose. The different functions of the key board are also controlled by a special instrument called “mouse”. There are several other methods to feed information into the computer which include floppy discs and CDs.

Input devices send the received data to CPU so that its arrangement and analysis may be done.

(ii) Central Processing Unit (CPU):

It is a type of a brain of the computer which performs the whole job. This part comprises of a control unit and a memory unit.

(iii) Output Devices:-

The internal working of the computer is represented by the out put unit. It resembles a television set which is called a monitor. All the processes can be observed on its screen while the print out of the result can be taken on a paper with the help of an attached printer. More over out put can be recorded on a floppy disc or CDs. Fast working of the computer, accurate solution of

the given information large memory and capability of deriving results increases its importance day by day and perhaps, there is no department left where man is not benefiting from its uses.

Q. What is Internet? Describe Briefly.

Ans. Internet:

Internet is a system with which we can know the global conditions within no time. Not only the informations on internet about the whole world are available but it has revolutionized the communication techniques. This new invention has given a large projection to communication. One can not imagine a speed greater than that by pressing a button you can send your message any where in the world. This source of communication is said to be an E-mail, internet users are provided the facility to send their messages or graphics and the receiver checks them in his spare time. Another important feature of the internet are world websites which is a wide storage of information.

Internet is infact an interconnection of millions of computers. It is neither for one person, nor is the possession of one. It is beyond imagination that a person or a department individually may run the internet. Internet society is a group of many departments which controls the internet. Internet is actually a process using which people can contact each other through computer. This contact is usually made by a telephone line or a cable. All computers linked with internet use uniform communication process and same code. In the internet terminology, it is called "protocol" whose name is TCP/IP. It is the abbreviation of transmission control protocol / internet protocol. This protocol controls the transmission and transmits a small portion of the information at a time. This process is repeated millions of times per second.

The language which is used in the internet web is understood well by all the computers linked with it and this language is called HTML which is an abbreviation of Hypertext Markup Language. Computers linked with the internet can exchange their information or can use the data base. In the beginning internet facility was limited to the government departments or big libraries, but the modern ways of communication have extended this facility. Now-a-days, not only national but at the international level, internet is an important and fastest medium of information. Students and teachers having contact with the internet can get information of any kind and about any subject. Businessmen can advertise their product by it. Doctors can exchange latest information about medical problems. In short, information concerned with every department can be obtained from the internet.

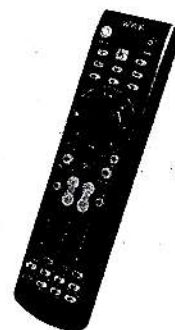
Q. What is Remote Control? How does it work? (L.B. '10)

Ans. Remote Control System:

It is an extremely useful instrument. The function of a television and some other electronic machines can be controlled by it from a large distance without any cable connection.

Infrared radiations are used to operate it. When any button placed at its panel is pressed, the bulb in control circuit generates a particular binary code signal. This signal emits, from a light emitting diode called LED, an infrared radiation of the same particular code.

When these radiations fall on a lens fitted in a television or any other electric machine then a photo transistor attached with the lens identifies and sends them to a



circuit which decodes the binary signal and issues the order accordingly. Thus we can control the function of the television or other appliances from far off distance by a remote control system.

Q. What are information storing devices? Explain them.

Ans. Information Storing Devices:

The world's information in the form of encyclopedia has been printed on paper, but the information is increasing so rapidly that to get some information from it to control its weight and volume has become very difficult. So the trend has increased to use such methods which do not use paper. So audio-video tapes, compact discs, laser discs, floppy discs and hard discs are in use for storing information. These devices can store a huge amount of information in a very small space. We can benefit from anyone of the devices as we require. Usually storage devices work on the principle of magnetism where as laser technology is used in CDs.

Audio and Video Cassettes:

Audio cassettes consist of a tape of magnetic material, on which sound is saved in a particular form of a magnetic field. For these purpose microphone changes sound waves into electric pulses which are made by an amplifier. Magnetic tape of the cassette is moved through the heads of audio cassette recorder, which is in fact an electromagnet. Change of current wire wrapped on the electromagnet causes a change in the linked magnetic field. Thus magnetic tape is magnetized in particular form according to rise and fall of current. In this way sound is stored in a specific magnetic pattern in this tape.

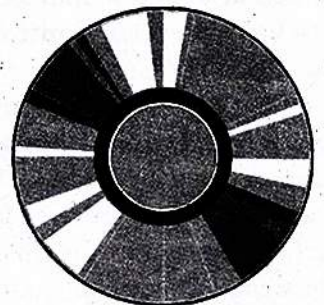


To produce the sound again the tape is moved past the play back head. Changes in the magnetic field on the tape induce alternating current signals in the coil wrapped on the head. These signals are amplified and sent to the loudspeakers which reproduce the recorded sound. In video tape pictures are recorded along with sound.

Q. Write a note on Compact Disc.

Ans. Compact Disc (CD):

Compact disc is a digital disc. Instead of wavy grooves, a pit pattern is formed on it. This pattern comprises of billions of pits of varying lengths and spaces set on a shiny disc. Their arrangement depends upon the variation of sound. Shiny area between two pits is called a "flat". Pit pattern can be read by a laser beam. Laser beam is focused on a track, it moves slowly across whole of the disc and the flats reflect the beam whereas pits do not. Thus after reflection when beam touches the head it indicates 1, hence the decoder receives a digital signal which changes it in to a continuously varying electric current. It is then sent to an amplifier and the loudspeaker.



Computer data is also stored in the CD,s. While using (CD ROM (Read Only Memory) in data is only read and it can not record. While reading the data, computer head does not touch

CD. That is why it is durable. Its storage capacity is many times greater than the floppy disk. About 650 MB (mega bite) data can be stored in it. It is packed in a box so that environmental pollution may not affect it. Movies can be stored in CD's which can be displayed on the computer or TV screen.

Q. What is floppy disk? Explain.

Ans. Floppy Disk:

Floppy disk is made of flexible plastic which is coated with ferromagnetic compound. The disc is housed in a protective jacket having several holes.

1. Write Protect Notch:

If write protect notch is opened data can not be entered on the disc and no alternation can be done in the previous data. If the slot is sealed then data can be entered on the disc and alternations can also be done in it.

2. Central Hole:

Floppy get fixed on a rotating rod or the spindle and can revolve.

3. Index Hole:

Near the central hole is located a small hole used to identify the starting position of the track.

4. Read/Write Hole:

Disc drive head R/W using this whole can read and write the data. The data is stored on about 2 cm strip of the disc. Floppy disc can store a data of about 1.44 MB.

Q. What is Hard Disk? Explain.

Ans. Hard Disc:

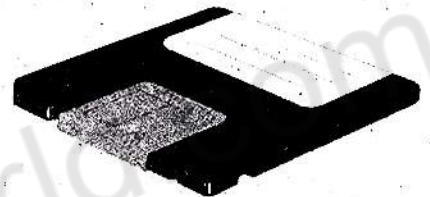
It is made of aluminum and hence it is not flexible. It is enameled with a layer of a material, (Fe, Co, Kr, Ni) that can be magnetized easily. Hard disc has higher speed and larger capacity as compared to other discs. This disc is also called the storage disc. Using this disc and by a control board a large number of information can be read and written. Hard disc is made by joining many plates. This disc revolves, in enclosed box with great speed about an axis. To keep in a closed jacket is to avoid exterior pollution. Because of its large capacity it has high density of data compared to other discs.

Q. What is meant by Word Processing?

Ans. Word Processing:

Definition:

"To type something by computer's keyboard, to correct, to arrange, to amend the document, to add and delete the written portion when required is called the word processing." Word processing is such a use of computer through which we can write letters, prepare reports and books. Word processing is a computer programme. By means of this we can develop any



document, see it on the screen after typing. Edit it, add some new text delete the previous text or do the amendments in it. Document can be stored in memory and its print can also be taken.

Q. What is Graphic Designing? Explain.

Ans. Graphic Designing:

Definition:

The process to draw required lines or pictures on a computer screen using mouse or keyboard is called the graphic designing. Designs of the buildings or components can also be drawn with the help of computer. This process is named as computer aided designing (CAD). Three dimensional (3D) coloured pictures can be drawn by this process which can be checked by rotating it at different angles. More over different colors can also be selected for the pictures. This process because of accuracy and comfort is very popular in industrial field.

Q. What is Data Managing? Explain.

Ans. Data Managing:

To collect all information's regarding a subject for any purpose and to store them in the computer in more than one inter linked files which may help when needed is called data managing.

The educational institutions libraries hospitals and industries store the concerned information by data management. Addition is made in the data according to the requirement which helps in the improvement of the management of the institutions.

In big departmental stores and super markets optical scanners are used to read with the help of a laser beam, to read the bar codes of a product which indicates the number at which this product is recorded in the register. In this way the detail about its price is obtained and the central computer monitors the bills and the related record of the sold goods. It also helps placing the order for goods being sold in a large quantity and to decide about less selling goods.

MULTIPLE CHOICE QUESTIONS

Q. Circle the correct answer.

1. Radio waves are:

- a) electric waves
- b) electromagnetic waves
- c) X-rays d) Radio-active rays

2. Which language is used in web pages?

- a) MTLH b) MT
- c) TML d) HTML

3. The process in which designs of buildings or components can be drawn with the help of computer is called:

a) word processing

b) computer aided designing

c) data managing d) designing

4. The data stores in C.D. is:

- a) 680 MB b) 650 MB
- c) 700 MB d) 750 MB

5. Hard disk is made of:

- a) Aluminium b) Copper
- c) Iron d) Plastic

6. CD which is made of soft material is called:

- a) hard disk b) floppy disk

- c) iron disk d) copper disk
7. A device which has two way communication is:
- a) Television b) Radio
c) Hard disk d) Mobile Phone
8. A device which is used to transmit text message is:
- a) Radio b) Fax machine
c) Telephone d) Radar
9. An example of input device of computer is:
- a) key board b) Printer
c) monitor d) RAM
10. A data storage device is:
- a) Printer b) hard disk
c) Monitor d) CPU
11. Waves whose speed is equal to speed of light are:
- a) X-rays b) sound rays
c) electromagnetic waves
d) shock waves
12. A device which can store data about 1.44 MB:
- a) Hard disk b) Compact Disk
c) Floppy Disk d) C.D rom
13. What is fitted in telephone receiver? (2007)
- a) electromagnet b) diaphragm
c) both a and b d) none
14. The method that is used to communicate information to far off places instantly is called:
- a) information technology
b) telecommunication
c) world processing
d) graphic designing
15. Information storage devices work on the principles of:
- a) heat b) sound
c) light d) magnetism
16. Which component is called brain of computers?
- a) CPU b) Printer
c) Keyboard d) monitor
17. High quality picture and sound is received on TV with the help of:
- a) sound waves b) Cable
c) Audio device d) waves
18. Which technology is used in mobile phone? (2005)
- a) heat b) radio
c) light d) Laser
19. Soft and flexible disc is called: (2006)
- a) CD b) floppy
c) hard disc d) metal disc
20. To get a design on the computer screen by moving a pointer with the help of mouse is called:
- a) word processing
b) Graphic designing
c) data managing
d) telecommunication
21. Telephone works on principle: (2007)
- a) Telex Machine b) Fax Machine
c) Telegraph d) Radio
22. Which of the following reasons increase the importance of computer?
- a) speedy
b) long time storage of memory
c) quick decision d) a,b and c
23. The speed of sound in air is kmh^{-1}
- (a) 1243 (b) 1244
(c) 1245 (d) 1246
24. It is essential to save floppy disc from
- (a) heat (b) magnet
(c) water (d) all of these

ANSWERS

1.	b	2.	d	3.	b	4.	b	5.	a	6.	b	7.	d
8.	b	9.	a	10.	b	11.	c	12.	c	13.	c	14.	b
15.	d	16.	a	17.	b	18.	b	19.	b	20.	b	21.	c
22.	d	23.	d	24.	d								

SHORT ANSWERS

Q.1: Define information technology.

Ans. Information Technology:

The scientific method of storing, arranging information for proper use and to communicate them to others is called the information technology (IT).

Q.2: Define telecommunication.

Ans. Telecommunication:

The method that is used to communicate information to far off places instantly is called telecommunication.

Q.3: What is internet? (L.B. '08)

Ans. Internet:

Internet is a system with which we can know the global conditions within no time. It is infact an interconnection of millions of computers.

Q.4: What do you mean by protocol. What are its functions?

Ans. All computers linked with internet use uniform communication process and same code. In internet terminology it is called protocol whose name is TCP/IP i.e. transmission control protocol/ internet protocol. It controls the transmission and transmits a small portion of the information at a time.

Q.5: Define word processing. (L.B. '08)

Ans. Word Processing:

To type something by computer's keyboard, to correct, to arrange, to amend the document, to add and delete the written portion when required is called the word processing.

Q.6: Define graphic designing.

Ans. The process to draw a required line or pictures on a computer screen using mouse or key board is called graphic designing.

Q.7: What is computer aided design (CAD)?

Ans. Designs of the buildings or components can also be drawn with the help of computers. This process is named as computer aided designing (CAD). Three dimensional (3D) coloured pictures can be drawn by this process.

Q.8: Define data managing.

Ans. Data Managing:

To collect all informations regarding a subject for any purpose and to store them in the computer in more than one inter-linked files which may help when needed is called data managing.

Q.9: Write the uses of fax machine.

Ans. Fax Machine:

Documents of considerable importance are sent from one place to other through fax machine with telephone line. Fax machine first gets the reflection of the document like Photostat machine, changes it into electronic signal and then transmits it via telephone line. The message when reaches the receiving fax machine, it produces the signals in an image print on a paper again.

Q.10: What is a computer?

Ans. Computer:

Computer is an electronic machine, which after analyzing and arranging the given information presents it in a very short time. All work is done by the computer in the light of those instructions, which are called a programme and is saved in its memory.

Q.11. What is the main difference between telephone and cellular phone?

Ans. Telephone changes sound into electrical signal and sends to receiver while mobile phone works on electromagnetic waves.

Q.12. Why cable TV is preferred? (I.B. '08)

Ans. Cable TV is preferred to obtained high quality picture and sound.

Q.13. In internet terminology, what is meant by protocol?

Ans. All computers linked with Internet use uniform process and same code. In the Internet technology it is called "protocol" whose name is TCP/IP.

Q.14. Why compact disc and hard disc are housed in a jacket?

Ans. The compact disc and hard disc are housed in a jacket to avoid exterior pollution. If this is not done then they can be damaged.

Q.15 What are the primary colours used in T.V?

Ans: There are three tubes or electron guns in a colour television set. One of them makes red, second makes green and the third makes blue picture. These are three colours of light. All other colours are obtained by complete picture is formed.

Q.16 What are super computer?

Ans The most powerful and swift computer which can send an information in one thousand billionth part of a second is called super computer. it contains many processors.

Q.17 How the floppy disc damage?

Ans: It is essential to save floppy disc from heat, magnet and water otherwise the stored data on it can be damaged.

Q.18 What is the electronic bank?

Ans Now a days home banking is operated on telephone you can find your bank on the telephone. You can pay all the kinds of bills and transfer your funds by pressing a key of your personal identification number. You can draw the money at any time you want with the help of ATM machine.